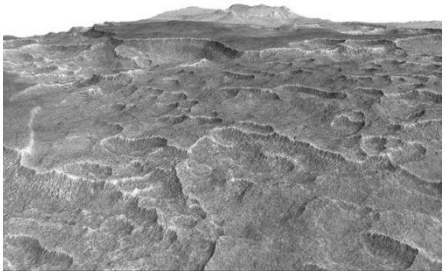
# Human Landing Sites Study (HLS$^2$) Newsletter – May 2017

Hello all:
We wanted to send an update on HLS$^2$ and several initiatives that are underway for 2017. JPL will issue an RFP to use existing data sets in innovative ways to help build better water maps on Mars. We are happy to announce several Google Hangouts planned for the upcoming months. We continue to make headway on the imaging/data requests from our last workshop and an update on our progress is included. Since our first HLS$^2$ Workshop, several reports have been written which look at options for water extraction on Mars. An overview and links to these reports are provided later in this newsletter. Finally, we are much closer to announcing an opportunity to prototype the development of Exploration Zones. Look for the update below.

**Announcement of Request for Proposals:**
**Mapping of Water Deposits to Support Mars Exploration Program Studies**



*Scalloped depressions at Utopia Planitia on Mars prompted scientists to look for subsurface deposits of water ice there*

JPL will issue a multi-directorate supported Request for Proposals (RFP) on June 1, 2017. The RFP seeks to better map water deposits in their various forms on Mars. The requested data products include: 1) A map of the distribution and concentration of near sub-surface water ice within a predefined swath extending from low to high latitudes; and 2) A global map cataloging all known surface hydrated mineral deposits and its characteristics. Notices of Intent (NOI) are encouraged and will be due two weeks after the release of the RFP.
Look for the announcement at:
https://www.jpl.nasa.gov/acquisition/opportunities/

**Announcement of Google Hangouts**

We will soon resume our Google Hangouts lecture series on subjects relevant to the HLS$^2$ community. Below is the schedule for upcoming briefings. We will be hosting these Google Hangouts on our YouTube channel (found here):

| Title | Date/Time (tentative) | Speaker(s) |
|---|---|---|
| Surface Power Considerations and How They Affect Latitude Choices | June 14 1:00pm | Michele Rucker, Len Dudzinski, Lee Mason, NASA |
| Antarctic Logistics Lessons for Mars: Eat your Dogs | July 12 2:00pm | Paul Sheppard, Systems Manager, Operations & Logistics US Antarctic Program, NSF |

These interactive lectures will be livestreamed via Google+ Hangouts, recorded, and made available online. We will soon send you calendar invites for the events. We hope that you will be able to join us.

Other upcoming Google Hangout topics include:

- Planetary Protection
- EVA Suit Operations
- Traverse Planning Considerations for Exploration Zones
- Report of Findings from MRO Imagery Requests

**HLS$^2$ workshop imaging and data requests from MRO:**
**Organized/Completed by exploration zones**

Here is an update on the data/imaging requests agreed to at the last HLS$^2$ workshop. As of February 17, 2017, 41 of 74 requests have been completed by the Mars Reconnaissance Orbiter. To be more specific, 26 of 29 HiRISE-driven targets have been acquired and 15 HiRISE of 45 CRISM-driven targets have been acquired. The list of targets and their completion status is outlined below. You can view hi-res copies of HiRISE photography labeled "Candidate Human Exploration Zones" here.

***Black = not complete; Blue = complete***

**Acheron Fossae: 2 CRISM (missing 1 CRISM)**
**Aram Chaos: 2 HiRISE (missing 1 CRISM)**
**Ausonia Cayus: 1 CRISM (missing 2 CRISM)**
**Columbus Crater: 1 HiRISE, 1 CRISM (missing 1 CRISM)**
**Coprates: 1 HiRISE (missing 1 CRISM)**
**Deuteronilus Mensae hummocky/lobate scarp: 3 HiRISE**
**Eastern Hellas: 1 HiRISE (missing 1 HiRISE)**
**Eastern Valles Marineris: (missing 3 CRISM)**
**East Melas: (missing 3 CRISM)**
**Erebus Montes: 2 CRISM (missing 1 CRISM)**
**Euripus Mons: 1 HiRISE (missing 1 HiRISE)**
**Gusev: 2 HiRISE (missing 1 CRISM)**
**Kesei Valles: (missing 3 CRISM)**
**Leaderberg: 1 CRISM (missing 1 CRISM)**
**Maja Valles: (missing 2 CRISM)**
**Mesopotamia: East Hellas Rim: 1 HiRISE, 1 CRISM (missing 1 CRISM)**
**Miyamoto region: 2 HiRISE (missing 1 CRISM)**
**Newton: 1 CRISM (missing 1 CRISM)**
**Nili Fossae: (missing 3 CRISM)**
**Noachis Terra Chloride-bearing: 3 HIRISE**
**Oyama: 2 HiRISE**
**Phlegra Dorsa: 3 HiRISE**
**Protonilus Mensae: 1 HiRISE (missing 2 CRISM)**
**Protva Valles: (missing 1 CRISM)**
**Southern Meridiani: (missing 3 CRISM)**
**South of Valles Marineris: 1 CRISM (missing 2 CRISM)**
**Western Pass: 1 HiRISE**
**W Gale: (missing 1 HiRISE)**
**Zephyria Planum: 2 HiRISE (missing 1 CRISM)**

*Candidate Human Exploration Zone in Zephyria Planum*

*As imaging/data requests are completed for individual EZs, we would like to ask for volunteers from among the original proposers to brief the larger HLS$^2$ community on what you have learned from these requests. Interested parties are asked to contact us at: nasa-mars-exploration-zones@mail.nasa.gov*

**Recently Released Reports of Interest to HLS$^2$ Community**

*The extraction of water from subsurface ice deposits may be critical to a sustainable long term human presence on Mars*

NASA recently released a report titled, "Assessments of ISRU Options in Support of Human Missions" which looked at the feasibility of "mining" water ice on the surface of Mars.

The report examines options for extracting water from sub-surface ice. Included in the report are appraisals of drilling and mining techniques used on Earth. The study concludes that the numerous technologies for water ice extraction used on Earth are well tested and analogous to those needed on Mars. Still, there is much more we need to learn before they can be successfully deployed such as the exact character and location of detected glacial deposits. Further recommendations range from the collection of more data for site selection to the construction of prototype extraction systems.

Find the full study at:
https://www.nasa.gov/sites/default/files/atoms/files/mars_ice_drilling_assessment_v6_for_public_release.pdf

The above report built on NASA's Mars Water ISRU Planning (M-WIP) report published in April of last year. The M-WIP report, a previous subject of a HLS$^2$ Google Hangouts, is available at:
https://mepag.jpl.nasa.gov/reports/Mars_Water_ISRU_Study.pdf

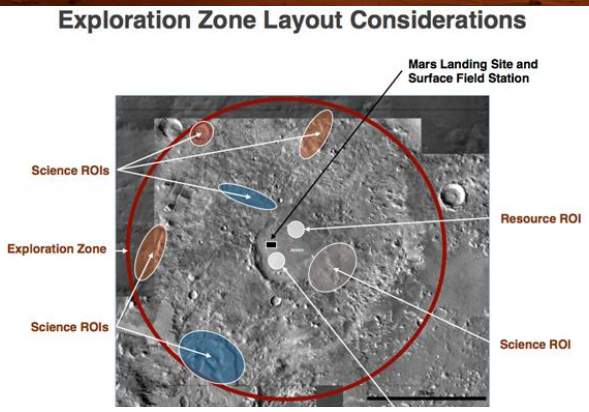
Or watch the briefing at: https://www.youtube.com/watch?v=iMfLQG4qpYM

**Prototyping the Development of Human Exploration Zones on Mars**

We will soon be announcing plans to prototype the development of exploration zones. This opportunity will be open to all who made an EZ proposal. We will charter two teams to create "prototype" analyses with one using an EZ in the equatorial region and the other a second EZ in the higher latitude regions (North or South). The key goals are to: identify what data and at what level of detail we need, capture processes, and generate or bring to bear analytic tools necessary to examine potential EZs. These factors together will define a systematic approach that can be applied to the analyses of all HLS$^2$ sites. Expected examples of objectives/goals include:

- Perform traverse analyses between the habitation zone and science and resource ROIs
- Analyze weather profiles (temperature, dust, solar incidence, etc.) at the EZ and provide an assessment of impacts to human operations there
- Identify how the habitation and primary landing zones would be selected
- Assess and identify the areal extent of different types of water feed stocks

Look for more updates soon.




*EZs are designed to provide for human sustainability and scientific exploration objectives*

**Opportunity for Internship at NASAHQ**

The Mars Exploration Program office of the Science Mission Directorate at NASA Headquarters in Washington, DC is looking for an unpaid intern for the summer or fall with a strong interest in the robotic/human exploration of Mars. We are looking for driven team players with strong writing and organizational skills to help with our ongoing integration efforts. Candidates will have the opportunity to learn about the strategy and next steps in NASA's journey to Mars. Additionally, the position can be molded to offer a research component for academic credit.

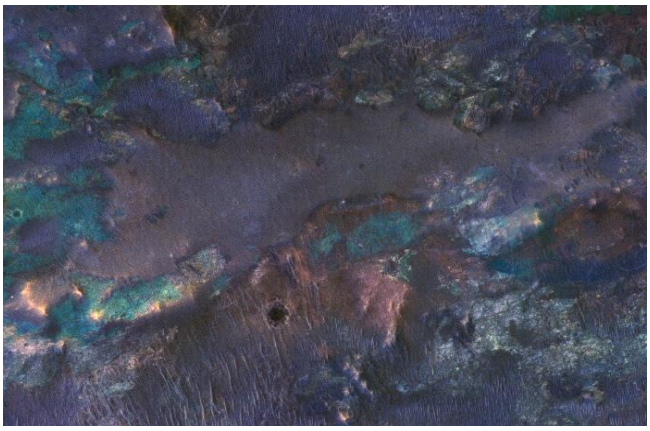
Interested applicants should reach out to: robert.b.collom@nasa.gov for more information.

**Next Human Landing Site Study Workshop**

- Anticipated for April/May 2018
- The HLS$^2$ Steering Committee needs to assess these dates to ensure that various projects are near enough completion as so to make substantive progress at next workshop.

**Images of Interest**


*The Curiosity Rover photographs its tread marks in the Martian sand during its ascent of Mt Sharp*



*MRO's view of the ejecta around Hargraves Crater highlights the rich mix of rocks in the diverse bedrock*

*Opportunity sits atop the rim of Endeavour Crater above Perseverance Valley to image ancient spillways*

*Seasonal Recurring Slope Lineae were documented by the MRO as it sailed above Valles Marineris*

**Links of Interest**

-The President held an interview with Peggy Whitson earlier this year to commemorate her record-breaking stay in space. Mars is discussed at several points throughout the interview.

It can be watched at:
https://www.youtube.com/watch?v=5HMwKwWnV4k

-ExploreMars.org hosted the Humans to Mars Summit from May 9th to the 11th. The following are links that may be of interest to the HLS$^2$ community.

The Humans to Mars 2017 report:
https://www.exploremars.org/wp-content/uploads/2017/05/H2MR_2017_Final_webv1.pdf
Why Mars Essay Anthology:
https://www.exploremars.org/why-mars-report

The Achieving Mars IV report:
http://astronautical.org/dev/wp-content/uploads/2017/04/Mars-AM-IV-Report-FINAL-.pdf
Recorded videos of the Summit Presentations:
https://livestream.com/viewnow/HumansToMars2017
Some Key Talks:

Opening Plenary – Robert Lightfoot (starts at 32 minutes):
https://livestream.com/viewnow/HumansToMars2017/videos/155950459
NASA Associate Administrator Panel (starts at 52 minutes):
https://livestream.com/viewnow/HumansToMars2017/videos/155950459
Protecting Mars and Earth in an Era of Extensive Exploration (starts at 2 hours):
https://livestream.com/viewnow/HumansToMars2017/videos/156360640
Risky Business: Risk Tolerance and Space Exploration (starts at 4 hours & 13 minutes):
https://livestream.com/viewnow/HumansToMars2017/videos/155974408

**Supplemental**

If you have links, studies, or research that you would like to share with the HLS$^2$ community please send them to: NASA-Mars-Exploration-Zones@mail.nasa.gov